and their products and the cells requiring protection. If these substances are introduced artificially in an available form, they might neutralize poisons in the blood and thus accelerate the work of the body leukocytes. Hiss used rabbits for most of the experiments; occasionally dogs and guinea-pigs were used. He speaks of the possible variations in the protective power of the leukocytes of different animal species. The leukocytes were obtained by double pleural inoculations with aleuronat. The resulting exudate was centrifuged and the serum decanted. The cells were either directly subjected to the extracting fluid or after washing with normal saline solution. The extracts were obtained by thoroughly emulsifying the cells in distilled water and allowing them to stand for a few hours at 37.5° C., and then at ice-box temperature until used. The resulting extract is shaken up before injection since there is often considerable cell residue which may contain some of the active substances. Dog leukocytes seem to go into solution very readily, while rabbit leukocytes are not materially changed morphologically. A very brief general summary of Hiss' detailed experimental evidence only is possible, but the evidence certainly seems to justify the belief that extracts of leukocytes furnish some means of combating infections. Animals suffering from severe septicemias and poisonings following intravenous injections of such organisms as staphylococci, streptococci, pneumococci, meningococci, and typhoid bacilli showed marked resistance after the leukocyte injections, when compared with the controls. In many instances they survived injections fatal to the control animals in thirty-six hours even when the treatment was delayed for twenty-four hours. The animals treated often showed a marked fall in temperature corresponding to the injections. The beneficial effect of the extracts was often seen in a diminution of the loss in weight or a rapid return to a normal weight. Animals thus treated often seem, for a time, much sicker than the controls. This is especially true in typhoid and meningococcus infected animals, and also occurs to some extent in cases of pneumococcic infection. Hiss thinks that this result may be due to an increased bacteriolysis and the consequent liberation of endotoxins, thus suggesting the presence of complementing bodies, or of digestive substances peculiar to the leukocytes. The immediate effect on the temperature and the rapid improvement in body weight give a strong impression that the principal substance at work is an antitoxin.

Hiss' conclusions are as follows: Extracts of leukocytes from normal rabbits have a distinct modifying and curative action when given subcutaneously or intraperitoneally to rabbits, even in systemic infections which are rapidly fatal in untreated rabbits. Rabbit leukocyte extracts are also similarly useful in infections of guinea-pigs. Extracts of leukocytes from immunized animals seem, in some instances at least, to have even greater curative effects than extracts from leukocytes of normal animals. The action of the leukocyte extract may be due to an increase of the bacteriolytic action of the animal's plasma by the introduction of complement or to the action of digestive substances usually not liberated from the leukocyte, but is most likely due to poison-neutralizing or destroying bodies which act on the endotoxins. These bodies he denotes by the term *endo-antitoxin.* Hiss finally says that it does not seem unlikely that extracts of leukocytes (polymorphonuclear and mononuclear) and possibly of the blood forming organs furnish us with means of combating infections incited by those microörganisms generally looked upon as giving rise to endotoxin poisonings and which have steadily refused to yield to the action of immune sera alone.

The Curative Influence of Extracts of Leukocytes upon Infections in Man.—Hiss and Zinsser (*Jour. Med. Research*, 1908, xix, 429) supplement the experimental work on animals with some observations upon the value of such extracts in the treatment of human disease. The extracts used were aqueous extracts of rabbit leukocytes, which were injected subcutaneously. Local reactions were slight, and lasted at most for a few hours. This treatment was carried on in twenty-four cases of epidemic cerebrospinal meningitis. Two of these cases were discharged against advice before the outcome of the disease could be foretold. Although they were apparently improved, they are not included in this report. Of the remaining 24 cases, 14 were discharged cured and 8 died. Fifteen of these 22 cases were under fifteen years of age, and of these 15, but three died, giving 80 per cent. of recoveries. Of the remaining 7 cases over fifteen years of age, 5 died. This may be due to the fact that several of these adult cases were in a moribund condition when admitted to the hospital. Some of these fatal cases in adults showed marked improvement under treatment, living twenty-seven, seven, thirty-eight, eleven, and twenty-five days after treatment was begun. They state that, of course, statistical studies of such a small number of cases is of little intrinsic value, but that their observations in the individual cases pointed very strongly to the beneficial effect of the leukocyte extract. Immediate improvement occurred after the injection of the leukocyte extract no less in some of the fatal cases than in those recovered. Such changes seemed more marked after the first injection than after later ones. There was an almost invariable improvement in those symptoms which depend upon the central nervous system, such as vomiting, delirium, stupor, and hyperesthesia. This improvement was so prompt that it seemed to exclude any anatomical changes, and, therefore, they believe these symptoms are due to the toxemia. A marked reduction in the temperature was usually caused by the injection. This reduction was often only temporary, and they believe that this is further evidence of an antitoxic action of the extract. A reduction of the leukocytosis occurred as the toxic symptoms lessened, and in some of the cases the spinal fluid became less turbid. They also treated seven cases of lobar pneumonia, and, although drawing no definite conclusions, they believe that further clinical tests may be of definite therapeutic value. In pneumonia there was an almost invariable drop in the temperature following a single injection of the extract. The antitoxic action is thus again suggested. The improvement in the subjective symptoms, the limitation of the lesions, and the increase in the number of leukocytes in some of the cases are additional factors which seem to indicate a more efficient operation of the natural agents of protection.

The Effect of Injected Leukocytes upon the Development of Tuberculous Lesions.—Opie (*Jour. Exper. Med.*, 1908, iii, 419) says that when tubercle bacilli are injected into the pleural cavities of dogs, the